

Guide to weekly application of fertilizer											
Week	Recommended fertilizer (lb/1 000 sq ft)					Nutrients supplied to crops ¹					
	10-52-17	20-5-30	KNO ₃ potas- sium nitrate	Ca(NO ₃) ₂ calcium nitrate	NH ₄ NO ₃ ammo- nium nitrate	MgSO ₄ magne- sium sulfate	N	P	K	Ca	Mg
						Soiless mix	54	44	149	966	14
1	3						13	30	78		
2	1						4	10	6		
3	4						4	10	6		
4	2					2	9	20	12		9
5		2	1	1			30	2	38	21	
6		2	1			2	23	2	38		9
7		2	1				37	2	38	21	
8		2				2	23	2	38		9
9		2					42	2	53	21	
10		2					28	2	53		
11		2			2	2	42	2	53	21	9
12		2					28	2	53		
13		2					42	2	53	21	
14		2			1	2	42	2	53		9
15		2		2			42	2	53	21	
16		2			1		42	2	53		
17		2		2		2	42	2	53	21	9
18		2			1		42	2	53		
19		2		2			42	2	53	21	

FERTILIZER SCHEDULE

for greenhouse
tomatoes
and cucumbers
in southwestern Ontario

Agriculture
Canada

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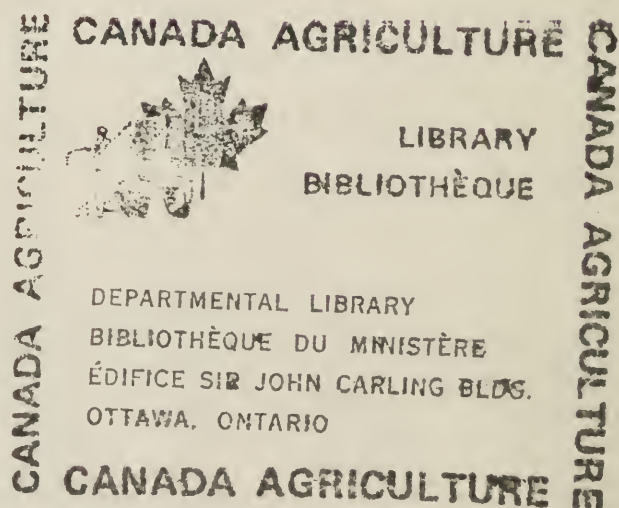
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in Southwestern Ontario*.

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FERTILIZER SCHEDULE

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In southwestern Ontario, greenhouse tomatoes and cucumbers are commonly grown on an annual two-crop system: the spring crop, January 15 to July 15, and the fall crop, August 1 to December 15. This scheduling often varies, however, for reasons of marketing, fuel costs, and disease susceptibility.

Like all crop plants, greenhouse tomatoes and cucumbers require a continuous supply of a properly balanced formula of mineral nutrients to grow normally and produce healthy high-quality fruit. The nutrients required in rather large amounts are listed below as major elements; the trace elements are nutrients required in very small amounts.

Major elements:		Trace elements:	
nitrogen	N	manganese	Mn
phosphorus	P	boron	B
potassium	K	iron	Fe
calcium	Ca	zinc	Zn
magnesium	Mg	copper	Cu
sulfur	S	molybdenum	Mo

The yield of fruit obtained from a plant of either crop varies with the amount of space it occupies, because of competition for light. Under good management and optimum conditions in southwestern Ontario, plants in the spring crop during 6 months absorb nutrients and produce fruit at the rates shown in Table 1.

Table 1. Typical crop production values

	Tomato			Cucumber					
	Per plant		Per acre*	Per plant			Per acre*		
				Seeded	sq ft (0.46 m ²)	9 sq ft (0.83 m ²)	Seeded	plants (12,000 plants)	Seedless
Spacing	4 sq ft (0.37 m ²)	10,890 (27,000)	plants (104 tons)	5 sq ft (0.46 m ²)	9 sq ft (0.83 m ²)	8,732 (21,500)	plants (12,000 plants)	4,840 (12,000 plants)	
Total weight	18.8 lb (8.5 kg)	104 (233)	tons (14 kg)	31 lb (14 kg)		135 (302)	tons (tonnes)		
Fruit weight	14.8 lb (6.7 kg)	82 (184)	tons (tonnes)	27 lb (12 kg)	50 lb (23 kg)	119 (267)	tons (tonnes)	121 (271)	tons (tonnes)
Water applied	32 gal (144 litres)	353,000 (3964 kl)	gal (kl)	36 gal (162 litres)		317,000 (3560 kl)	gal (kl)		
Water in fruit	93.4 %	15,420 (173.2 kl)	gal (kl)	95.8 %		22,800 (256.0 kl)	gal (kl)		
Dry matter in fruit	0.98 lb (0.44 kg)	5.47 tons (12.3 tonnes)	tons (tonnes)	1.13 lb (0.51 kg)	2.10 lb (0.95 kg)	5.01 tons (11.2 tonnes)	tons (tonnes)	5.08 tons (11.4 tonnes)	
Nitrogen removed		345 (386)	lb (kg)			260 (291)	lb (kg)		
Phosphorus removed		74 (83)	lb (kg)			82 (92)	lb (kg)		
Potassium removed		716 (801)	lb (kg)			491 (550)	lb (kg)		
Calcium removed		295 (330)	lb (kg)			211 (236)	lb (kg)		
Magnesium removed		43 (48)	lb (kg)			51 (57)	lb (kg)		

Note: Metric equivalents are given in parentheses.

* Metric equivalents are expressed per hectare.

Precrop fertilizers

Soils differ widely in the amounts of nutrient reserves that they can supply to plants. A highly fertile soil probably has enough of all the nutrients for the production of a good crop, but continued cropping depletes these amounts substantially. The light sandy soils of southwestern Ontario have very limited reserves. You must therefore apply large amounts of fertilizer for good crop production, usually on a continuous basis throughout the growth period. The fertility level of a soil may be increased before planting by applying superphosphate or 0-20-20 at rates of up to 25 lb/1,000 sq ft (12.2 kg/100 m²). The initial rate of application should be based on a preliminary soil test, and subsequent feeding rates should be adjusted accordingly.

A precrop application of calcium and magnesium is recommended because the increasing amounts of potassium applied during the growing season sometimes prevent the absorption of enough calcium and magnesium by the plant roots. The amounts recommended are 6 lb magnesium sulfate and 50 lb calcitic limestone per 1,000 sq ft (2.9 and 24.4 kg/100 m²). Additional calcitic limestone should be added to raise the pH of the soil if a soil test has indicated a pH of lower than 6.5. After the soil has been steamed and leached, all precrop fertilizers should be worked in with a rotary cultivator.

Soiless culture

Tomatoes and cucumbers can also be grown successfully by soiless culture in inert media such as peat, peat and vermiculite, peat and perlite, sawdust, bark chips, sand, or water, which have no nutrient reserves. Soil-less culture therefore requires a more complete precrop preparation than is required when soil is used. Table 2 shows the formula for one soiless mix that can be used for satisfactory crop production. The nutrient content of this mix is shown on the first line of Table 3.

Table 2. Peat-vermiculite mix	1 cu yd	1 m ³
Peat (sphagnum)	11 bu	0.5 m ³
Horticultural vermiculite	11 bu	0.5 m ³
Limestone (pulverized FF)	10 lb	5.7 kg
Superphosphate 20%	2 lb	1.1 kg
Potassium nitrate (KNO ₃)	1 ½ lb	0.9 kg
Magnesium sulfate (MgSO ₄)	½ lb	0.3 kg
Chelated iron (Fe)	1 oz	35 g
Borax (sodium borate)	½ oz	18 g
Fritted trace elements	3 oz	106 g

Table 3. Guide to weekly application of fertilizer

Week	Recommended fertilizer, lb/1,000 sq ft *					Nutrients supplied, lb/acre **					
	10-52-17	20-5-30	KNO ₃ potas- sium nitrate	Ca(NO ₃) ₂ calcium nitrate	NH ₄ NO ₃ ammo- nium nitrate	MgSO ₄ magne- sium sulfate	N	P	K	Ca	Mg
						Soiless mix ▶	54	44	149	968	14
1	3						13	30	18		
2	1						4	10	6		
3	1						4	10	6		
4	2					2	9	20	12		9
5		2	1	1			30	2	38	11	
6		2	1			2	23	2	38		9
7		2	1	2			37	2	38	21	
8		2	1			2	23	2	38		9
9		2	2	2			42	2	53	21	
10		2	2				28	2	53		
11		2	2	2		2	42	2	53	21	9
12		2	2				28	2	53		
13		2	2	2			42	2	53	21	
14		2	2		1	2	42	2	53		9
15		2	2	2			42	2	53	21	
16		2	2		1		42	2	53		
17		2	2	2		2	42	2	53	21	9
18		2	2		1		42	2	53		
19		2	2	2			42	2	53	21	
20		2	2		1	2	42	2	53		9
21		2	2	2			42	2	53	21	
22		2	2		1		42	2	53		
23		2	2	2			42	2	53	21	
24		3					26	3	33		
25		3					26	3	33		
Total fertilizer	7	44	34	19	5	14	797	114	1055	200	63
Fertilizer plus soiless mix							851	158	1204	1168	77

* To convert the unit lb/1,000 sq ft to its metric equivalent kg/100 m², multiply the number by 0.488.

** To convert the unit lb/acre to its metric equivalent kg/ha, multiply the number by 1.1.

Fertilizer schedule

Table 3 recommends a schedule for the weekly application of fertilizers on soils commonly found in southwestern Ontario and on the soiless mix described above. This schedule should be used only as a guide and should be adjusted to the fertility level of the soil and the progress of the crop in each greenhouse. Plant growth should be watched carefully, and

tissue tests and soil tests should be made periodically. No formula can substitute for good judgment. The schedule can be used for any crop if adapted in the following ways:

- | | | |
|----|---|--|
| 1. | Spring crop, low fertility soil, most tomato varieties | — follow schedule unchanged |
| 2. | Spring crop, low fertility soil, early-setting varieties of tomato such as Vendor | — omit weeks 3 and 4; proceed immediately to week 5 after week 2 |
| 3. | Spring crop, any variety of seeded or seedless cucumber | — omit weeks 2, 3, and 4; proceed immediately to week 5 after week 2 |
| 4. | Fall crop, tomato | — omit weeks 2, 3, and 4; proceed immediately to week 5 after week 2 |
| 5. | High fertility soil | — apply fertilizer at half the recommended rate until midseason |
| 6. | Soilless culture | — use 10-52-17 and 20-5-30 with added trace elements |
| 7. | For 10-52-17 | — substitute 9-45-15 or 10-52-10 if desired |
| 8. | For 20-5-30 | — substitute 20-20-20 and increase KNO_3 if desired |

Calcium, magnesium, and trace elements

When the tomato plant is lacking calcium, blossom-end rot appears on the fruit. If this occurs in spite of the recommended precrop soil treatment and the calcium application suggested in Table 3, apply calcium phosphate to the soil two or three times during the first half of the growing period at 2 lb/1,000 sq ft (975 g/100 m²) or increase the recommended calcium nitrate application during the last half of the growing season. If soil application is ineffective, a spray of calcium chloride solution may be applied to the leaves at 5 lb/100 gal of water (2.3 kg/500 litres).

Magnesium deficiency in tomato or cucumber may cause a characteristic interveinal yellowing of the lower or middle leaves. If this symptom persists and increases in spite of recommended applications of magnesium fertilizers, apply magnesium sulfate as a spray at 5 lb/100 gal of water (2.3 kg/500 litres).

Warning: Do not mix or apply in the same solution a fertilizer containing calcium and one containing sulfate or phosphate. This mixture makes a thick suspension that plugs up mechanical watering equipment.

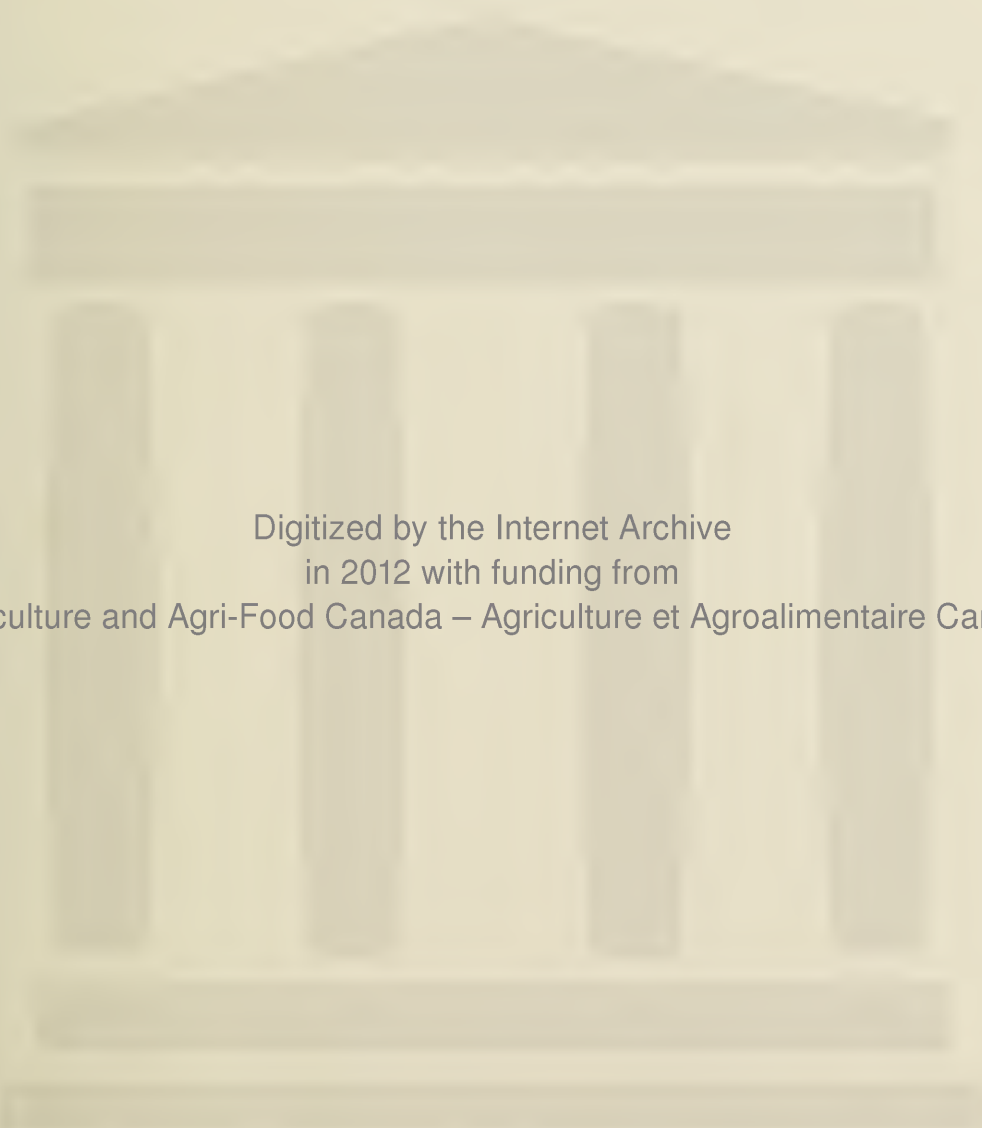
Do not apply trace elements to a greenhouse soil as a regular part of

the schedule. If you suspect that one or more of these elements are lacking, have tissue and soil tests made. Get the advice of an agricultural specialist before applying a remedy.

CONVERSION FACTORS FOR METRIC SYSTEM


Imperial units	Approximate conversion factor	Results in:
LINEAR		
inch	x 25	millimetre (mm)
foot	x 30	centimetre (cm)
yard	x 0.9	metre (m)
mile	x 1.6	kilometre (km)
AREA		
square inch	x 6.5	square centimetre (cm ²)
square foot	x 0.09	square metre (m ²)
acre	x 0.40	hectare (ha)
VOLUME		
cubic inch	x 16	cubic centimetre (cm ³)
cubic foot	x 28	cubic decimetre (dm ³)
cubic yard	x 0.8	cubic metre (m ³)
fluid ounce	x 28	millilitre (ml)
pint	x 0.57	litre (l)
quart	x 1.1	litre (l)
gallon	x 4.5	litre (l)
bushel	x 0.36	hectolitre (hl)
WEIGHT		
ounce	x 28	gram (g)
pound	x 0.45	kilogram (kg)
short ton (2000 lb)	x 0.9	tonne (t)
TEMPERATURE		
degree fahrenheit	° F-32 x 0.56 (or ° F-32 x 5/9)	degree Celsius (° C)
PRESSURE		
pounds per square inch	x 6.9	kilopascal (kPa)
POWER		
horsepower	x 746	watt (W)
	x 0.75	kilowatt (kW)
SPEED		
feet per second	x 0.30	metres per second (m/s)
miles per hour	x 1.6	kilometres per hour (km/h)
AGRICULTURE		
bushels per acre	x 0.90	hectolitres per hectare (hl/ha)
gallons per acre	x 11.23	litres per hectare (l/ha)
quarts per acre	x 2.8	litres per hectare (l/ha)
pints per acre	x 1.4	litres per hectare (l/ha)
fluid ounces per acre	x 70	millilitres per hectare (ml/ha)
tons per acre	x 2.24	tonnes per hectare (t/ha)
pounds per acre	x 1.12	kilograms per hectare (kg/ha)
ounces per acre	x 70	grams per hectare (g/ha)
plants per acre	x 2.47	plants per hectare (plants/ha)

Examples 2 miles x 1.6 = 3.2 km; 15 bu/ac x 0.90 = 13.5 hl/ha



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